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ABSTRACT

The aim of this research project was to analyze the interaction of supply and demand factors in order to explain secular changes in the value of human time, with special reference to investment in education. The methodology used was an economic analysis that applied economic theory to determine the supply of and demand for education by treating education as an investment in future earnings and satisfaction. A major part of the research involved measuring increases in real wages and salaries from 1900 to 1975; short-term fluctuations were then analyzed as departures from the prevailing trend. An approach was designed to determine the economic value of human agents' ability to deal successfully with the economic disequilibria resulting from constantly changing economic conditions in a modernizing economy. Results of the analysis support the hypothesis that the level of education has a strong positive effect on human agents' ability to deal appropriately with the various economic disequilibria that occur as a consequence of modernization. (Author/JG)

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FINAL REPORT ON
"ECONOMIC ANALYSIS OF INVESTMENT IN EDUCATION"

A GRANT AWARD

ADMINISTRATIVE DATA

1. Grant Award No.: NE-G-00-3-0153
2. Title: Economic Analysis of Investment in Education
3. Principal Investigator: Theodore W. Schultz
Department of Economics
4. Sponsoring Institution: The University of Chicago
5801 Ellis Avenue
Chicago, Illinois 60637
5. Amount of Grant Award: \$76,260
6. Duration of Grant: 6/27/73 to 3/31/77
7. Signature of Principal Investigator: T. W. Schultz

May 21, 1977

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AIMS OF THE PROJECT

8. Briefly describe the specific aims of your project, indicating major changes in direction from the original aims:

The aim of this project was to analyze the interacting supply and demand factors in an endeavor to explain the secular changes in the value of human time, with special reference to investment in education. The economic thinking that served to guide the analytical work remained essentially as set forth in the original proposal. The measurement of the increases in real wages and salaries over the long period from 1900 to 1975 has been a major part of the research. Once the strong upward trend in real hourly earnings was established, it became evident that large fluctuations occurred over short periods. These fluctuations were then analyzed as departures from the prevailing trend.

Throughout the research, the testable implications derived from the several parts of the economic theory proved to be richer and more meaningful than was anticipated at the outset.

9. Were the original aims of the project pursued? XX Yes No

CONDUCT OF RESEARCH

10. Describe the methodology used in your research, including size and characteristics of any sample used, instruments developed or data analysis.

The methodology used is strictly an economic analysis. It consists of economic theory applied to determine the supply of and demand for education. Education is treated as an investment in future earnings and in future satisfactions. Testable implications are derived from the theory, and these implications are then put to test empirically. In this context, education is a scarce resource and to have it entails measurable costs. These costs consist of two parts, namely public (social) costs and private costs borne by parents and by students. The earnings that mature students forego while they acquire their education is an important cost component.

The first step was to investigate a neglected part of the economic value of education. The labor market earnings by education have been analyzed with care and with considerable success by economists. The value of the acquired ability associated with education in dealing with economic disequilibria had received little attention except for studies concentrating on the responses of farmers to new and better production opportunities.

The modernization of the economy clearly entails constantly changing economic conditions requiring adjustments and adaptations by human agents - by business men, farmers, housewives, laborers, and students. An approach was designed to determine the economic value of this ability of human agents to deal successfully with disequilibria. The results of the analysis support

CONDUCT OF RESEARCH, continued

the hypothesis that the level of education of each of these classes of human agents has a strong positive effect on their ability to perceive, to interpret correctly, and to act appropriately in dealing with these various disequilibria that occur as a consequence of modernization. The findings of this investigation were published in The Journal of Economic Literature, September 1975, under the title, "The Value of the Ability to Deal with Disequilibria."

The second step was to undertake the measurement of the secular changes in the value of human time. The concept of normal real hourly wages was developed and treated as the base price of human time. The extent to which the salaries of educated people in the labor market exceeds this base price is treated as compensation for the investment that they made in their education. As a first approximation of this base price, estimates of the total real compensation per hour at work of manufacturing production workers in the United States for selected years from 1900 to 1972 were used. These estimates are expressed in 1967 dollars. The increases over time in the supply of labor by education was readily determined, but the factors that accounted for the increases over time in the demand for labor by education became difficult because of unsettled analytical economic issues. It turns out that the secular increases in the demand for more educated workers is a function of the complementarity between the high skills associated with education and various new forms of material capital. A part of the study to get at this complementarity required knowing the changes in the real prices of the services of renewable and nonrenewable natural resources over time. The Potter-Christy estimates of the prices of the resource services were updated and much improved by using the new estimates made by Professor Robert S. Manthly of Michigan State University, who was most generous in making his estimates available for this study.

At this point, the marked upward trend in the earnings of employed workers in the United States was compared with the historical patterns of real wages in industry in France, Germany, Sweden, and the United Kingdom between 1900 and 1970, which was made possible by appealing to the estimates of E. H. Phelps Brown.

The findings of this second step in the research of this project are being published in two major papers: (1) as an essay on "The Economic Value of Human Time Over Time," being published by the Economic Research Service of the U.S.D.A., Washington, D.C. and (2) a substantially extended essay prepared for the Fifth World Congress of the International Economic Association meeting in Tokyo, Japan, August 29 to September 3, 1977 and to be published by the Association under the title "On the Economics of the Increases in the Value of Human Time Over Time."

The third step is an investigation of the fluctuations in wages and salaries by education as departures from the strong upward trend in the value of human time. In taking this step, the fluctuations in earnings of four classes of workers were estimated consisting of unskilled workers, manufacturing production workers, elementary and secondary school teachers and of associate professors. This study carries the title "Education in an Unstable Economy." This study provides a historical analysis of various marked fluctuations in

CONDUCT OF RESEARCH, continued

earnings that have occurred repeatedly in the past and services as a critical corrective of the Over-Educated American theses based on the behavior of wages and salaries of educated people since 1969. New data have made it possible to extend and improve the first draft of this important paper.

11. Did you have any significant methodological difficulties (e.g., sampling, instrumentation, inference)? Yes XX No

except in dealing with the analytical issue of complementarity referred to in 10 above.

12. Did you have any significant practical operational difficulties (e.g., access, personnel, logistics)? Yes XX No

RESULTS

13. Describe your conclusions or results (a) as they relate to your specific aims (include negative results), and (b) their significance in relation to the field.

There is firm evidence in support of the hypothesis that the ability to deal successfully with economic disequilibria is enhanced by education and that this ability is one of the major benefits of education accruing to people privately in a modernizing economy. It is revealed in the equilibrating performance of housewives, laborers, students, and farmers. There is no reason to suppose that it is not important in the case of businessmen, although as yet the necessary evidence is lacking. Unless we develop equilibrating models, the function of this particular ability cannot be analyzed. Within such models, entrepreneurship is a scarce resource and the quality of the supply of entrepreneurial ability is enhanced by education.

Although the study of the ability to deal with disequilibria was not designed to evaluate the fashionable idea that schooling is (solely) a screening device for identifying pre-existing innate abilities, the economic value of education that is revealed for those who are self-employed (see especially the section on agricultural production, pages 840-43 of the published paper "The Value of the Ability to Deal with Disequilibria," supported by strong evidence) implies that the screening notion is a will-o'-the-wisp.

In a few advanced countries the value of the time of the rank and file of people is exceedingly high. The high price of human time that characterizes these exceptional countries is from the viewpoint of economic history a recent development. In these countries the secular increases in real wages and salaries represent gains in economic welfare, which are the most significant achievement of their economic growth. Much less time is allocated

RESULTS, continued

to work for pay. Most of the work is no longer hard physically. Ever more skills associated with education are demanded, and the supply response of skills by education is strong and clear. But the increases in demand are still concealed in the complementarity between the various new forms of capital and education.

Seeing the historical fact that despite the vast accumulation of capital the real rate of return to investment has not diminished over time, it is evident that the improvements in the quality of the labor force and of the advances in the sciences affect over time the rate of return on investment. There has been much aimless wandering in analyzing growth that could have been avoided had the perceptions of Marshall been heeded.

"Capital consists in a great part of knowledge and organization," and that "knowledge is the most powerful engine of production;...The distinction between public and private property in knowledge and organization is of great and growing importance: in some respects of more importance than that between public and private property in material things."¹

Public and private investment in human capital and in useful knowledge are a large part of the story in accounting for the increases in the value of human time, over time.

A basic characteristic of modern economic growth of the type that distinguishes the United States, clearly so since 1900, is the pronounced upward trend in the value of human time. The rise in real hourly earnings of manufacturing production workers which rose from \$.60 in 1900 to \$3.37 in 1975, is a useful measure of this trend. In this type of growth, the changes over time in the value of education rest on two propositions. The first proposition pertains to the secular movement and the second to fluctuations in earnings by education that occur as short-run departures from the upward trend. The first proposition is of two parts, namely: (1) the price of the time of the more educated workers in the labor force declines relative to the price of the time of the less educated, and (2) as the relative difference between these prices of time by education declines secularly, the absolute difference not only persists but tends to increase sufficiently to make the investment in education worthwhile. The second proposition encompasses various short-run fluctuations in the value of time that occur as a consequence of depression and recovery, inflation-deflation and the unstable demand for labor; they also occur in part because of the effects on the supply of labor of wartime recruitment and subsequent demobilization of the armed services and because of demographic movements which, however, occur less abruptly than the recruitment and demobilization effects.

¹ Alfred Marshall, Principles of Economics, Macmillan and Company, 1920, Book IV, pp. 138-9.

RESULTS, continued

14. Describe other findings not directly related to the specific aims (serendipitous findings) and their significance:

The value of the acquired ability by education of entrepreneurs who are self-employed raises serious doubts with respect to the so-called "screening hypothesis" in evaluating education.

The changes in the pattern over time in the relative earnings between the less and the more educated workers show that the relative difference between them declines over time. As a consequence, employers have an incentive to substitute in favor of the more educated workers, and as this occurs, the labor market for the more educated expands relative to the overall employment of labor. Despite this relative decline in the earnings of the more educated, because of the strong upward trend in the value of human time in general, the absolute difference in earnings of the more educated workers does not decrease but in fact tends to increase sufficiently to make the investment in education worthwhile.

Short-run fluctuations in the earnings by education are not appropriate in determining the lifetime economic value of investments in education.

15. Would you describe the results of your project as:

Confirming your hypotheses XX

16. Did your research result in significant methodological developments? If yes, describe: XX Yes No

(1) The extension of theory to cope with the "allocative ability" of human agents by education.

(2) In analyzing the growth in the demand for workers by education, the role of the complementarity between the high skills associated with education and the skill requirements of various new forms of material capital is an analytical advance.

(3) The departures of earnings by education from the strong upward trend in the value of human time is an important analytical extension in economic analysis in ascertaining the lifetime economic value of education.

IMPLICATIONS

17. What further research, if any, do you plan in this area?

In the context of education in an unstable economy, further investigation will be undertaken to determine the short-run effects of various rates

IMPLICATIONS, continued

of inflation, of increases and decreases in the rate of unemployment, and of wartime recruitment for the armed services and subsequent demobilization, on the fluctuations in earnings by education.

18. What are your specific suggestions for additional research by others in this area?

The value of the acquired ability of entrepreneurs in business by education calls for systematic analytical research.

The effects of the growth in employment by the public sector (by local, state, and federal agencies) in the upward trend in earnings by education awaits careful analysis.

The economic, political and institutional factors that account for the short-run fluctuation in earnings by education requires careful and competent analysis.

19. What are the policy or program implications of your study?

The depressed labor market of the mid-seventies for college graduates is not proof that Americans are over-educated. This depression is a departure from the long upward trend in real wages and salaries including the market price of the services of college graduates. In making plans for lifetime earnings that entail investment in education, whether they are private or public plans, it is inappropriate to base such plans on short-run fluctuations in the earnings associated with education.

The private and public benefits of education are undervalued to the extent that the abilities acquired by education increase the capacity of human agents to deal with economic disequilibria are not reckoned in determining the optimum investment in education. In an advanced, ever changing, modernizing economy, the quality of the supply of entrepreneurial ability of laborers, farmers, businessmen, housewives, and students is important. Clearly, education increases the quality of the supply of this particular ability.

In clarifying and evaluating policy options, both private and public, there is much aimless wandering in analyzing the sources of economic growth. It is imperative in this context to take into account the fact that a country's productive resources consist in large part of human acquired abilities and of advances in useful knowledge and that these abilities and this knowledge are the "most powerful engine of real production."

DISSEMINATION

20. As an appendix, list publications (and articles accepted for publication) resulting from this project; note those which in your opinion have a minimal relationship to the study.

"The Value of the Ability to Deal with Disequilibria," Journal of Economic Literature, September 1975.

"The Economic Value of Human Time Over Time," publication forthcoming by the Economic Research Service, U.S. Department of Agriculture.

"On the Economics of the Increases in the Value of Human Time Over Time," publication forthcoming by the International Economics Association. This paper is to be presented at the Fifth World Congress of the International Economics Association, Tokyo, Japan, August 29-September 3, 1977.

"Education in an Unstable Economy," publication is anticipated when the revision and extension of this paper are completed.

21. What are your plans for future publications, papers, and/or application(s) of the results of your study?

As indicated above, the paper "Education in an Unstable Economy" is intended for future publication.

22. What are your suggestions for additional dissemination of the results of your study? Please specify appropriate audience.

The four major papers reporting each of the major parts of the research under this project will reach professional economists inasmuch as the publications in which they have or will appear are widely used by economists. Whether or not these studies (papers) are suitable in their present form for dissemination to non-economists is an open question.